CUSHIONING SELF-CLOSING PACKAGING MATERIAL

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of copending U.S. patent application no. 09/934,971, filed August 21, 2001, and a continuation-in-part of U.S. patent application no. 09/781,181, filed February 12, 2001, the content of each of which is expressly incorporated herein by reference thereto.

FIELD OF INVENTION

This invention relates to a paper-plastic laminate packaging material and a paper-plastic-paper laminate packaging material in the form of sheeting which is capable of being converted into a self-closing package. These materials include a layer of cohesive on one side to enable the material to be self-adhering after being placed around or about an item to be packaged. The resulting package is another embodiment of the invention.

BACKGROUND ART

In the past, both paper-plastic laminate sheeting and cohesives have been developed. U.S. Patent No. 5,244,702 discloses a paper-plastic laminate sheeting capable of being converted by conventional equipment into envelopes, grocery bags and other dilatable container products that are initially in a flat state. This patent describes a paper-plastic laminate sheeting in which a facing paper sheet is cold-laminated to a reinforcing film of synthetic oriented plastic material, whereby the properties of the oriented film are unimpaired and the products made therefrom have exceptional strength tear and burst characteristics. U.S. Patent No. 5,780,150 discloses a sealing tape constituted by a paper-plastic laminate for sealing a carton or other article formed of recyclable material.

The use of cohesive materials in product packaging are generally known in the art. U.S. Patent No. 6,076,969 issued to Jaisle et al. discloses a product package having a re-sealable closure employing a cohesive and a pressure-sensitive adhesive for reseal capability. U.S. Patent No. 5,655,707 to Jensen discloses a paperboard container fashioned from a unitary blank which is precut and pre-scored to yield desirable fold lines, with the top of the container being provided with a pair of upstanding flanges having a strip of cohesive material so that the two upper flanges are secured together by virtue of the cohesive material on each.

There is a large increase in the mailing of packages due to catalog sales, sales over the internet and other fulfillment houses. Most of these packages are of heavy paper or

cardboard construction. Such constructions are convenient, provided in different sizes and are of low cost, but these constructions are not resistant to moisture in the form of snow, rain or other forms of water. The increased number of packages to be shipped creates a need for new and improved, flexible packaging materials that can be used to accommodate different sizes of such packages as well as to protect such packages from adverse weather conditions during shipment.

PCT publication no. WO02/064365 discloses a flexible, tough and water-impermeable laminate sheeting that is used as a packaging material for enclosing articles to be shipped or mailed. While the packaging material and resulting packages made from the laminate sheeting of that document are useful for their intended purpose, there remains a need for other packaging material for similar and related uses, such as shipping articles of a relatively fragile nature. The present invention now provides such a material.

SUMMARY OF THE INVENTION

In accordance with the present invention, a new packaging material in the form of a unitary laminate sheeting has been developed. The package-forming material comprises a unitary sheeting of a first paper layer laminated to a water-impermeable plastic film for forming a package which encloses and seals an article therein. The film and paper layer advantageously have the same dimensions, and the laminate has a surface that is receptive to receiving adhesive or cohesive materials. A coating of cohesive material covers at least a portion or all of one of the first and second outer surfaces, and the packaging material can be placed about an article to be packaged such that a first portion of the surface of the packaging material that includes cohesive material contacts another portion of the surface that includes cohesive material to adhere such portions to each other and form a sealed package which encloses the article. Preferably, the cohesive material is applied upon the entire first or second outer surface, so that the adhered cohesive portions form an adhered band which surrounds the article to be packaged.

Preferably, the water-impermeable plastic film has a first corona discharge treated surface that is laminated to the first paper layer. Alternatively, the plastic film of the laminate includes a second corona discharge treated surface that is adhesively laminated to a second paper layer.

Another embodiment relates to a package-forming material wherein the laminate is fluted or corrugated to provide cushioning to the article enclosed by the sealed package.

The invention also relates to a package comprising the package-forming material disclosed herein. Preferably, the cohesive material is present upon first and second surface portions of the packaging material and the package is formed by placing the first surface of the packaging material above the article to be packaged and by placing the second surface portion of the packaging material below the article to be packaged, such that the first and second surface portions of the packaging material that include the cohesive material contact and adhere to each other to form a sealed package which encloses the article.

In this package, the first and second surface portions of the packaging material are provided on one side of a single sheet of the laminate and then the sheet is folded around the article to be packaged to place the cohesive material containing portions in face-to-face orientation so that they can adhere together to form the package. Alternatively, the first and second surface portions are provided as first and second laminate sheets which are placed above and below the article to be packaged with the cohesive material containing surface portions in face-to-face orientation so that they can adhere together to form the package. Thus, the adhered cohesive portions can form a margin which completely surrounds the article to be packaged.

Another embodiment of the invention relates to a process for creating a package which encloses and seals an article therein. This method includes the steps of:

providing a packaging material in the form of a laminate that includes a water impermeable plastic film that is laminated to a first paper layer, wherein the film and paper layer have the same dimensions, and the laminate has a surface that is receptive to receiving adhesive or cohesive materials;

applying a cohesive material to one entire surface of the laminate; and

forming a package by placing the packaging material about an article to be packaged such that a first portion of the surface of the packaging material that includes cohesive material contacts another portion of the surface that includes cohesive material to adhere such portions to each other and form a sealed package which encloses the article.

In this process, the plastic film of the laminate can include a second surface that is adhesively laminated to a second paper layer, wherein the laminate is further prepared by corona discharge treating the second surface of the plastic film to render it receptive to adhesives, followed by laminating the second surface of the plastic film to the second paper layer.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, reference is made to the detailed description of the invention and the accompanying drawing therein:

Fig. 1 illustrates a flexible, paper-plastic laminate sheeting in accordance with the invention;

Fig. 2 is a perspective view of the self-closing package material of the laminate sheeting of Fig. 1 ready for folding around an article to be packaged.

Fig. 3 shows an article, such as a box, wrapped with the packaging material of the invention.

Fig. 4 is a perspective illustration of a fluted laminate sheeting according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention resides in a self-closing packaging material formed from a unitary paper-plastic laminate sheeting, in which at least a portion of one entire side of the laminate sheeting is coated with cohesive material. In accordance with the present invention, an article can be placed on the cohesive coated surface laminate sheeting and the coated laminate sheeting can be folded over so that the opposing cohesive coated surfaces of the laminate sheeting will stick to themselves and thereby secure and package the article therein. The self-closing packaging material may form a "fitted" package so that the article contained inside is snug and tightly held in place.

The present invention includes a laminate sheeting material with a cohesive material coated thereon. The laminate sheeting is a two ply or alternatively, may be a three ply laminate. The laminate sheeting is then coated with a layer of cohesive material. It may be desirable in some situations to coat less than the entire surface of the laminate sheeting. Accordingly, a screen type roller or rotary screen printing device can be used to selectively apply the coating upon only specific areas of the laminate sheeting. In addition, a spray head or series of spray heads may be used to selectively deposit a particular or random pattern. The pattern can be arranged to achieve a desired cohesive adhesion of the overall laminate sheeting. Preferably, the coating can be applied to the entire outer surface of the laminate sheeting.

The type and amount of coating to be applied will vary depending upon the results desired. For example, when packaging articles of a standard size, the packager may desire packaging material that does not have a layer of cohesive material applied to one entire

surface of the laminate sheeting. Instead, it may be desirable that the laminate sheeting have cohesive material coated only on the perimeter of the laminate sheeting so that the packaging material does not have cohesive in the areas of the sheeting that would be covered by the article. Thus, less cohesive would be needed and the packaging material would be less costly and a more efficient use of cohesive would be provided.

The plastic film layer may be oriented to impart high strength thereto. A biaxial orientation is preferred for greatest strength. The plastic film layer preferably comprises a polymer selected from the group consisting of polypropylene, polyethylene and polyester and has a thickness of from at least about 0.5 to 3 mils.

The material to be laminated to paper can also be a paper sheet that is treated by the addition of a plastic coating, fiber reinforcement or metallization. These treatments enhance the moisture resistance and/or strength properties of the paper and the enhancement is then imparted to the laminate and the container.

The second sheet is made of paper. Any type of paper can be used, including kraft paper, white paper or even paperboard. These materials can be of any desired weight for such containers. The paper layer of the packaging material preferably has a thickness of from about 3 to about 6 mils.

The laminate can be formed in any conventional way. It is entirely suitable to laminate these materials using a hot melt adhesive or a reaction cure adhesive provided that care is taken to assure dimensional stability until the laminate is formed after those adhesives set and/or cure. For example, when hot melt adhesives are used, such as conventional heat-meltable polyethylene adhesives, care must be taken so that the paper and other material do not slip apart or otherwise move away from each other until the adhesive cools and sets to form the laminate. The reaction cure adhesives of the type disclosed in US patent 5,037,700 can also be used, but these generally require the addition of heat to facilitate curing to form the laminate. Again, care must be taken with such adhesives so that the paper and other material do not slip apart or otherwise move away from each other until the adhesive sets and cures to form the laminate. Also, a 100% solids adhesive can be used as disclosed in US patent 6,673,465, the entire content of which is expressly incorporated herein by reference thereto to the extent necessary to understand this embodiment.

As noted, a preferred material for the outer wall member of the laminate is a polymer film, preferably one that is transparent and is uniaxially or biaxially-oriented for increased strength. Film materials suitable for this purpose are polypropylene, polyethylene, or a polyester such as MYLAR. The tensile strength of the film is substantially increased by

orientation which results in molecular orientation of the film. In the case of biaxial orientation, orientation is in both the longitudinal and transverse directions. This is usually effected by controlled stretching of the unoriented film. The tensile strength of an oriented film is seriously impaired, however, if heat is applied thereto, for the heat acts to relax the film and cause it to lose its molecular orientation. Thus when oriented films are used, cold lamination is preferred for forming the laminate. The well known techniques disclosed in US patents 5,244,702 and 6,652,984 are useful for this purpose and the content of each of those documents is expressly incorporated herein by reference thereto to the extent necessary to understand these techniques.

When a transparent outer surface is not needed, the film or first sheet may be metallized. When a transparent film is to be metallized, this may be done on the side of the film that is laminated to the paper so that the metallized surface is protected against abrasion, wear or damage due to rough handling.

Preferably, the polymer or plastic film is cold laminated to the paper sheet under pressure and at ambient temperature (i.e., without the intentional addition of heat) by means of a water-based adhesive. A polyacrylate copolymer adhesive, or by any other water-based adhesive having similar bonding properties and having an affinity both for the paper sheet and the polymer or plastic film or metal foil can be used. Preferably, the water-based adhesive is a vinyl acetate ethylene copolymer.

Since paper tends to absorb water in the laminating process, before the paper sheet and the film are together fed into pressure rolls and subjected to pressure to effect lamination, a surface of the film is first coated with the water-based adhesive which does not encounter the first surface of the paper sheet until these two surfaces meet in the pressure rolls. In this way, the period during which absorption of the adhesive into the interior of the paper sheet can take place is limited. And to render the first surface of the film more receptive to the water-based adhesive applied thereto, it is preferably first subjected to ionization to enhance the dynes on this surface. Hence, when the adhesive-coated film web and paper web together enter the combining station and are subjected to pressure by pressure rolls, lamination is effected by this action. The paper layer absorbs the water from the adhesive so that a high strength lamination can be rapidly achieved as the paper and film exit the pressure rollers. These features are disclosed in the incorporated documents so that they do not require further explanation herein.

The cold lamination process enables the present laminate sheeting to be manufactured at much higher speeds than when other adhesives, such as hot melt adhesives, are utilized, for

example due to the additional time required for cooling of the hot melt adhesive before a secure bond is achieved. Another benefit of the use a water-based adhesive in a cold lamination process is that this type of adhesive does not require the use of volatile organic solvents. Thus, adverse health and environmental effects are avoided because such solvents are not used. Also, additional costs for recovering or disposing of solvents are not incurred.

Another benefit of the use of a water based adhesive is that this type of adhesive does not require the use of volatile organic solvents. Thus, adverse health and environmental effects are avoided because such solvents are not used. Also, additional costs for recovering or disposing of solvents are not incurred.

As noted above, the laminate sheeting includes a layer of cohesive material. The exposed plastic film of the paper/plastic film laminate can be corona discharge treated, so that the cohesive material may be applied to it with the paper layer forming the outer side of the packaging material. In this embodiment, the paper may be printed with graphics or the like to form an aesthetically pleasing packaging material. Alternatively, the cohesive material can be applied to the paper layer so that the exposed plastic film forms the outer side of the packaging material. Graphics or other printing can be applied to the side of the paper layer that is laminated to the plastic so that when clear plastic is used the graphics are visible through the plastic film. Also, the side of the paper layer facing the inside of the packaging can have the same or different graphics on its entire surface or only on those areas that are not covered with a layer of cohesive material. For either embodiment, the plastic film provides moisture resistance for the articles that are covered by the packaging material. The resultant laminate sheeting with cohesive coating thereon forms a self-closing packaging material that is flexible, water resistant, strong, and is capable of packaging articles of various sizes.

An unexpected benefit of the present packaging material is provided by the use of the paper/film laminate. The incorporation of this paper-plastic laminate into the packaging material provides sufficient body to resist twisting or curling to enable the material to be easily handled without concern of the material curling and sticking to itself.

Depending on the type of packaging material desired, the packaging material may further include an additional paper layer to form a paper-plastic-paper, three-ply laminate sheeting. The extra paper layer may be desirable for packaging objects with pointed edges or simply when a packaging material with more strength is desired. As the paper layers form the inner and outer sides of the packaging material, they can easily be printed with graphics or other indicia prior to application of the cohesive material. This enables the packaging material to have one appearance on the outside of the package and another, different

appearance on the side of the material that faces the package. Advertising, coupons or other forms of indicia can be provided on the inner side if desired, in locations where cohesive material is not provided for use after removal of the packaging material.

Furthermore, if a decorative packaging material is desired, the packaging material may comprise a metallized or preferably aluminized paper ply wherein the metallized or aluminized surface of the paper ply forms the exterior of the package and the opposing surface is cold laminated to the plastic film ply. The plastic film ply is coated with cohesive material so that when the packaging material is in operation, the resultant package has am exposed decorative outer surface. An aluminized surface is preferred when a silver finish is desired, but other metallizing treatments, e.g., with copper, iron, or alloys, can be used when other colors are desired. Metallized surfaces of the paper or plastic film can be provided to impart improved water permeability to the laminate. Aluminized paper or an aluminum coated film laminated to paper can be used for this purpose.

The packaging material of the present invention is preferably stored on a roll and dispensed therefrom as needed. It is understood by skilled artisans that cohesive material coated surfaces will readily stick and bond to other surfaces that are coated with like cohesive material coatings, but will not stick or bond to surfaces that are not coated with such cohesive material. Since the cohesive material only sticks to itself and only one surface of the packaging material contains the cohesive, when the packaging material is rolled up, the coated surfaces do not make contact with an opposing coated surfaces and no barriers are required to prevent the sheeting from sticking to itself while stored on the roll.

For applications, the packaging material can be used in automated wrapping equipment, wherein the resultant package is automatically wrapped by a machine generally known in the art, or alternatively the packaging material can be used in manual wrapping, wherein the packaging material is pulled off and cut from the roll, an article is placed on the surface of the packaging material and the packaging material is folded over and about the article. In either method of wrapping an article, the opposing coated surfaces of the packaging material come into contact and form cohesive-cohesive bonds thereby enclosing the article and forming a self-closing package. Alternatively, instead of packaging an article with one unitary sheet of packaging material, it may be desirable to use two sheets of packaging material. The two sheets of packaging material are placed on top of each other such that the cohesively coated surfaces of each unitary packaging material are opposing surfaces, the article is placed between the two sheets and the two sheets are placed in contact with each other so the contacted portions of the coated surfaces of the sheetings form

cohesive-cohesive bonds and the article is enclosed within the packaging material, thereby forming a self-closing package.

One feature of the present invention is that it is capable of packaging articles of various sizes and shapes. The packaging material simply is pulled off the roll in an amount that accommodates the particular size of the particular article to be packaged.

When a resealable package is desired, a non-adhered internal liner can be used as described in copending U.S. patent application no. 09/934,971, filed August 21, 2001.

When it is desired for the packaging material to include a cushioning feature, this can be achieved by fluting or corrugating any of the laminates of the invention. Corrugating is easily done by passing the laminate through a roller that has intermeshing strips or ribs and grooves. The result is a material that looks like corrugated cardboard, but has a plastic layer, either on one side or sandwiched between two paper layers, to impart moisture resistance to the material.

Instead of uniform corrugations, a fluting design can be imparted to the laminate. These can be provided as chevrons, Z or S shaped configurations, dots, bumps, or other non-linear shapes. These provide cushioning to the material that is sealed within the package. The ends or margins of the package surrounding the article are typically flattened during the joining procedure. The flat margins provide further cushioning to the package if it is dropped on one of its edges or corners.

It may be desirable that the packaging material have printable surfaces so that logos, messages, advertisements, emblems, trademarks or simply, addressee information etc., may be printed on the exterior or interior surfaces of the formed package. In this regard, the paper ply layer includes a printable surface. The decorative packaging material, if desired, may include a printable surface of metallized paper. Further, the plastic film ply may include a second corona discharge treated surface to render it receptive to inks so that it may exhibit graphics that may be desired. The outer surface of the plastic film ply may be metallized as by vacuum deposition to provide a decorative package.

The plastic-paper laminate sheeting

Referring now to FIG. 1, shown therein in an enlarged scale is a flexible paper-plastic sheeting S in accordance with the invention. Sheeting S includes a paper facing ply 10 whose gauge, weight and quality are appropriate for the self-closing package.

The paper ply 10 is laminated by an adhesive layer 11 to a plastic film ply such as polypropylene or polyester (MYLAR). In a preferred embodiment, the inner surface of the

plastic ply 12 is rendered wettable by a corona-discharge treatment to enhance the energy at this surface so that it is receptive to adhesives, and is then cold-laminated to the paper ply 10.

As shown, a layer of cohesive material 13 is coated on the exposed surface of the paper ply 10, so that the laminate sheeting will stick to itself by forming cohesive-cohesive bonds when the cohesive surfaces come into contact with each other. Alternatively, the cohesive material can be applied to the exposed surface of the plastic ply 12.

The plastic film ply 12 is no greater than 3 mils in thickness and is at least about 0.5 to 1 mil in thickness. The paper base ply 10 is thicker, preferably being 2 or 3 mils thick.

When the plastic film ply is biaxially-oriented, it has exceptional tensile strength, such orientation being effected by stretching the film along both its transverse and horizontal axes to molecularly orient the film structure. The strength of the thicker paper base ply 10, per se, is not high, but the paper-plastic laminate has both body and high strength. For retaining the strength of the plastic film, cold lamination is used to laminate the film to the paper ply.

The preferred cold lamination of the plies is effected by a water-based adhesive, preferably a water-based vinyl acetate ethylene copolymer composition having an affinity both for the paper ply and the film ply. Because the water-based adhesive is fluid at ambient temperature and is not a hot melt adhesive; no heat is applied to the oriented film as it is being laminated to the paper ply. A water-based adhesive, once cured, is not water soluble and is not remoistenable.

It is important to bear in mind that an oriented film is heat-sensitive and that at elevated temperatures, the film relaxes and loses its molecular orientation and strength. It is known, for example, that when two sheets of oriented polyester film are seamed together, using an ultrasonically-activated sealing bar for this purpose which creates internal friction and heat within the film, this causes the superposed films to soften and fuse. The resultant sealing line is weak, and the sheets then tend to tear along this line. Cold lamination is therefore essential to the present invention in order to produce paper- film laminate of high strength.

It is to be noted that a synthetic plastic film material, such as polypropylene, is normally not receptive to adhesives, especially water-based adhesives. Hence if one were to apply to the surface of this film a water-based adhesive which is flowable at ambient temperature or at a temperature somewhat above ambient but not at the elevated temperature of a hot melt adhesive, the adhesive will not be adsorbed by the film.

The self-closing packaging material

Fig. 2 shows a unitary paper-plastic laminate sheeting with an article to be packaged upon the inner surface of the sheeting. As illustrated, the cohesive coated inner surface 13 is folded over so that the laminate sheeting forms two opposing inner surfaces, each coated with cohesive material so that when one surfaces come into contact with the other, cohesive-cohesive bonds are formed thereby sealing and closing the material around an object placed thereon to form a sealed package.

Another way to make such a package is to use two separate sheets of cohesive coated laminate material with the article to be packaged placed therebetween. The cohesive-coated portions that come into contact with each other stick together to form a secure seal around the article.

Fig. 3 shows cross section view of an article contained within the self closed package. The self-closing package was formed by the plastic-paper laminate sheeting S of Fig. 1, being folded around and about article 15 as suggested in Figure 2, so that the cohesive coated surface 13 come into contact and form cohesive-cohesive bonds, thereby securing the sheets together about and enclosing the article 15.

Cushioning Packaging Material

The cushioning packaging material is illustrated in Fig. 4. This material includes a laminate of paper and plastic L that is provided with flutes or corrugations 20 in a sinusoidal pattern across the entire laminate. These flutes or corrugations act like small shock absorbers to provide cushioning and impact protection to articles that are packaged by the laminate L.

As the flutes or corrugations provide an uneven surface, it is generally necessary to flatten those portions of the packaging material that are to be joined to for a secure bond and seal around the articles to be packaged. The final package has a cross section that is similar to that of Figure 3 except that the outline of the laminate would include the flutes or corrugations to provide a cushioning effect. In addition, the flattened and sealed areas around the package provide additional cushioning since these areas can bend or flex to absorb forces if the package is dropped on the edges of those areas.

The overall arrangement is very useful for shipping relatively delicate or fragile articles. Of course, additional cushioning with conventional materials such as bubblewrap, padding or peanuts, can be included to further protect the item or article to be shipped.